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**CANADA-QUEBEC SUBSIDIARY AGREEMENT  
ON FOREST DEVELOPMENT  
1985-1991**



**EVALUATION STUDY**

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**Canada**

**Québec** 



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SUBSIDIARY AGREEMENT  
ON FOREST DEVELOPMENT  
1985-1991

EVALUATION STUDY

Prepared for  
The Management Committee  
by  
The Evaluation Sub-Committee

July 1991



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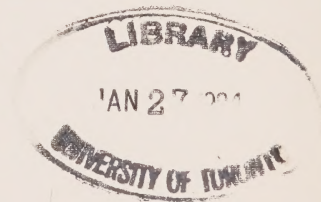
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ON FOREST DEVELOPMENT

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## SUMMARY

This study constitutes the final evaluation of the Canada-Quebec Subsidiary Agreement on Forest Development (1985-1991). The overall objective of this Subsidiary Agreement was to implement appropriate measures to stimulate forestry development and to increase the contribution of forestry to economic development in Quebec.

During the 1985-1991 period, expenditures under the Agreement reached \$305.7 million. The allocation of this sum to each of the seven programs under the Agreement was as follows:

Programs	Expenditures (\$ millions)	Percent
Crown Land Forest Management	189.4	62%
Private Woodlands Management	89.2	29%
Indian Lands Management	3.9	1%
Greenhouse Infrastructures	9.5	3%
Fight Against Maple Dieback	6.3	2%
Management, Information, Evaluation	5.4	2%
Communications	1.9	1%
TOTAL	305.7	100%

The main results achieved by the Agreement are found in the area of silviculture. In particular, they include 362 900 hectares of site preparation prior to planting, 336 300 hectares of planting, and 77 900 hectares of regeneration tending.

The criteria and methodology used in the evaluation are aimed at measuring the socio-economic and financial impact of the Agreement, in order to verify whether objectives have been achieved. This impact is expressed in terms of socio-economic impact on Quebec society as a whole and of financial impact on the provincial and federal governments. The impact is associated with implementation of the programs themselves and the processing of timber

volumes becoming available for harvest as a result of the Agreement. Total impact includes direct, indirect and induced effects.

This approach allows evaluation of most of the economic and financial effects generated in Quebec by the Agreement. Some effects could not be measured, however. These mainly involve "forward linkages effects" created by processing of the timber volumes becoming available. These effects include, in particular, jobs involved in transporting the finished products to outside markets and those linked to final processing in Quebec (furniture manufacturing, for example).

Identified effects are considerable. The major effects are as follows:

- . Timber volumes becoming available for harvest as a result of the Agreement are estimated at 12.1 million cubic metres, 64% of which is expected to be obtained in the short term and 36% in the long term.
- . Direct employment generated by implementation of the programs is estimated at 6 900 person-years and corresponds to about \$195 million in salaries. If indirect and induced employment are added, the total impact of implementation represents 12 500 person-years and \$279 million in salaries.
- . Still in terms of employment, total impact (direct, indirect and induced) created by processing of harvestable timber volumes represents 36 700 person-years and \$925 million in salaries.
- . Quebec society would realize benefits of \$456 million in social gains from employment, resource rent and foreign exchange earnings from exports.
- . Financial benefits to provincial and federal governments in fiscal and para-fiscal revenues and stumpage fees are expected to amount to \$638 million.

- . Benefits to both governments from budgetary savings in social assistance and unemployment insurance should be about \$60 million.
- . Furthermore, the Agreement was found to generate several positive externalities. These include soil and water protection, development of silvicultural expertise, several specific socio-economic impacts of the Indian Lands program and assistance to regional economic development. Some negative externalities have also been noticed regarding the environment.

These estimates indicate that about 80% of the impacts are associated with processing of harvestable timber volumes and 20% with implementation of the programs. About 70% of the impact is produced in the short term and 30% in the long term.

On the whole, spillover effects show that the Canada-Quebec Subsidiary Agreement on Forest Development has reached its overall objective by generating benefits capable of stimulating forestry development and of increasing the contribution of forestry to economic development in Quebec.





## INTRODUCTION

On December 14, 1984, the Federal Government and the Government of Quebec renewed their Master Agreement concerning the economic and regional development of Quebec. This Agreement focussed, among other things, on the principle of intensive management of Quebec forests as a means of developing the forest industry and creating jobs.

A few months later, on April 30, 1985, the Minister of State (Forestry) and his Quebec counterpart signed the Subsidiary Agreement on Forest Development. This five-year agreement was aimed at the implementation of means of increasing the contribution of forestry to economic development.

With an initial \$300 million budget, the Agreement at first included five programs: Crown Land Forest Management (\$190 million), Private Woodlands Management (\$90 million), Indian Lands Management (\$4 million), Greenhouse Infrastructures (\$10 million) and Management, Communications, Evaluation (\$6 million). A management committee composed of representatives from both levels of government was struck to manage the Agreement.

Over the years, the Subsidiary Agreement on Forest Development underwent some changes. These included an extension of the Agreement to March 31, 1991 and in March 1988 the addition of a five-year program to fight against maple dieback. This new program was provided with a budget of \$10.1 million, \$3.8 million of which covered the 1988-1991 period. It should be noted here that, since April 1, 1991, in practical terms, the Agreement only provides the financial basis for the two final years of the program to fight against maple dieback, the other programs having been completed.

The present evaluation study covers the period from 1985 to 1991. It was prepared based on the criteria and methodology of an evaluation framework developed by the Agreement Evaluation Sub-committee (Sous-comité d'évaluation, 1987).

This study has four parts. The first part establishes the levels at which the evaluation is made as well as the criteria used. Evaluation constraints are also described. The second part describes the main methodological steps used in determining the socio-economic and financial impacts of the programs. The third part deals with certain calculations and the impact of the Agreement. Finally, the fourth part sets out conclusions.

## **1. LEVELS OF OBJECTIVES AND EVALUATION CRITERIA**

First of all, this section describes the levels of objectives of the Agreement. Secondly, it presents the criteria used to measure program impacts and establish whether objectives have been achieved.

### **1.1 Levels of objectives**

These correspond to the three levels of objectives mentioned in the text of the Canada-Quebec Subsidiary Agreement on Forest Development.

#### **Level 1 : Overall objective**

To implement appropriate measures to stimulate forestry development and increase the contribution of forestry to the Quebec economy.

#### **Level 2 : Specific objectives**

- a) To encourage and support forestry management activities in order to increase timber supply, so as to best ensure the long-term economic performance and competitiveness of the Quebec forestry industry.
- b) To bring back into production Quebec productive forest Crown Land and private lands, including Indian Lands in Quebec.
- c) To encourage applied forestry research activities related to the programs under the Agreement, as well as the circulation of results.
- d) To control maple dieback.

### **Level 3 : Operational objectives**

This third level corresponds to program activities and objectively verifiable indices used to measure obtained results.

#### **1.2 Evaluation criteria**

Given the levels of objectives under the Agreement, it was agreed to produce a quantitative evaluation of the economic impacts on Quebec society as a whole and the financial impacts for both the provincial and the federal government. These effects are associated with implementation of the programs themselves or with processing of the timber volumes harvested short or long term as a result of the Agreement.

It should be noted that this type of evaluation is not a profitability analysis based on financial criteria such as net present value, cost-benefit ratio or internal rate of return. Instead, it involves an estimate of the costs and benefits (advantages) produced by the programs under the Agreement. These costs and benefits are estimated from the point of view of Quebec society as a whole and from that of public finances.

First of all, the evaluation criteria are listed in Section 1.21. The concepts underlying these criteria are defined in Section 1.22. Finally, Section 1.23 presents some impacts of the Agreement not included in the evaluation process.

##### **1.21 Criteria**

###### **a) Socio-economic spillover effects**

These spillover effects are identified as follows:

- . Direct, indirect and induced employment (person-years):
  - .. created by the implementation of Agreement activities;



- .. produced by the processing of timber volumes made available by the projects under the Agreement.

- . Before-tax salaries and wages for each of the three effect categories (direct, indirect and induced).
- . Social gains:
  - .. social gains from employment by effect category;
  - .. resource rent for harvestable timber volumes;
  - .. earnings in foreign currencies from export of the products derived from timber volumes;
  - .. externalities, positive or negative.

#### b) Financial impacts on governments

These include the following criteria:

- . Financial benefits to both governments for each of the three effect categories;
- . Budgetary savings for unemployment insurance and social assistance payments.

### 1.22 Definition of concepts

#### Timber volumes made available

This concept corresponds to additional timber volumes made available by the projects under the Agreement. These volumes are produced either short term (allowable cut effect, harvest during silvicultural operations) or long term (at the time the treated areas can be harvested). It should be noted that the estimation of benefits associated with timber processing is based on the assumption that the total harvestable volumes will indeed be harvested and processed.

### Direct effects

According to the Bureau des Statistiques du Québec (B.S.Q., 1986), "direct effects correspond to the expenditures in salaries and other gross revenues in the sectors which meet the initial demand". In the case of the Agreement, direct employment is employment involved in carrying out the projects as well as employment resulting from processing the additional timber volumes harvested as a result of the projects undertaken under the Agreement.

### Indirect effects

Still according to the B.S.Q. (1986), "indirect effects correspond to the effects on all the suppliers in the production sectors, the suppliers of these suppliers, etc.". Here we are therefore dealing with the "backward linkages effects" of the activities. These effects are simulated using the Quebec input-output econometric model. In the case of the Agreement, indirect employment corresponds to those workers producing machinery, equipment, supplies, etc. required for carrying out the activities. It also includes the workers supplying raw material and goods and services required for processing timber volumes which become available.

### Induced effects

Induced effects arise from the increase in household expenditures and public and parapublic expenditures. For example, those taking advantage of the direct and indirect employment generated by the Agreement will benefit from an increase in income because they have jobs. These same workers will then increase their consumption of goods and services. The additional labor required to provide them with these goods and services is an induced effect of the Agreement. To calculate induced effect, a Keynesian multiplier is used. This multiplier has been estimated at 1.60 for Quebec. This estimated value was determined by Éconosult (1984) using the Quebec input-output model. In this case, the only calculation

to be carried out is to multiply direct and indirect employment figures by 1.60 to obtain the induced effect on employment.

### Social gains from employment

Related to salaries and wages, this variable represents the excess benefits to workers employed in a job generated by the Agreement, compared to the benefits they would have obtained, on average, within the Quebec economy (opportunity cost), if the Agreement had not been implemented. The social gains from employment are estimated based on variables such as the probability that an average worker will find work during a year, the salary by worker category and the value of leisure time or, more precisely, the value of the time spent away from work.

It should be noted that social gains from employment constitute the only evaluation criterion, the calculation of which explicitly takes opportunity cost into account, that is to say, the benefits forgone by reason of carrying out a project. For this reason, social gains from employment on the one hand, and salaries and wages on the other, are two different kinds of socio-economic spillover effects, the values of which cannot be taken as a whole.

### Forest resource rent

"By definition, the concept of resource rent corresponds to the value put by society on the assignment of a scarce resource which is potentially usable to satisfy the commercial needs of the users. As applied to the forest, resource rent is equal to the value of standing timber." (Éconosult, 1984)

For the Agreement, this variable corresponds to the additional harvestable timber volumes made available by the management projects, multiplied by the unit value of this standing timber (unit stumpage value).

### Earnings in foreign currencies

These are the gains for Quebec society resulting from forest product exports outside Canada, as a result of the additional timber volumes available. Jenkins and Chun-Yan (1984) have estimated that for every dollar of goods exported 0.066 additional dollars are generated in Canada. The present study uses this figure and therefore assumes that Quebec receives all the earnings in foreign currencies produced by the Agreement.

### Externalities

In this study, externalities refer to those effects which are not directly related to the objectives of the Agreement or which are not included in the other evaluation criteria. Externalities can be positive or negative. They can include soil protection, environmental pollution, formation of silviculture companies, etc. Since these variables and their impact are difficult to measure within the framework of the present study, only a qualitative description will be given.

### Financial benefits for the governments

The financial benefits accruing to both the federal and the provincial government include income taxes paid by workers, para-fiscal payments by workers and enterprises (Pension Plan, Labor Health and Safety Commission, Quebec Health Insurance Plan, Labor Standards Commission, Unemployment Insurance) and indirect taxes calculated by the Quebec input-output model. In the case of financial advantages due to increased timber supply, corporate income tax (for sawmills and pulp and paper mills) and stumpage fees payable in cash can be added to the previous financial benefits.

### Budgetary savings for governments

Other impacts of this Agreement include budgetary savings for both the federal and the provincial government in unemployment insurance and social assistance. These savings are



estimated based on variables such as the average benefits paid in unemployment insurance and social assistance, the probability of receiving these benefits and the number of jobs created by investments under the Agreement

### **1.23 Impact not considered**

The criteria used in the evaluation omit certain effects of the Agreement on the Quebec economy. These are mainly "forward linkage effects", especially as regards processing of timber volumes. In particular, jobs associated with the transportation of finished products to external markets (export of lumber, commercial pulp, paper, etc.) as well as jobs associated with the final processing inside Quebec (e.g., furniture manufacturing) are not taken into account.

In addition, the evaluation methodology does not allow identification of economic activity linked to the volumes of wood and maple syrup saved as the result of the Fight Against Maple Dieback program. This can be attributed to a lack of knowledge about the real impact of fertilization treatments.

Furthermore, the evaluation criteria cannot be used to measure economic spillover effects generated by the technological impact from applied research. Research of this type was conducted under the programs for managing Crown woodlands and for controlling maple dieback.

Again, since the evaluation methodology is aimed at measuring the effects obtained in Quebec, the study ignores the benefits the Agreement generates in the other Canadian provinces and the impact of these benefits outside Quebec on the federal treasury. Such benefits can be attributed notably to the processing of wood volumes imported from Quebec.

## 2. MAIN METHODOLOGICAL STEPS

This section presents the main methodological steps required in the calculation of the evaluation criteria described in Section 1.2. As shown in Figure 1, these steps are as follows:

- . List investments under the Agreement by program and activity for the 1985-1991 period.
- . On the basis of the investments in forest management, calculate the impact of the projects on timber supply, and estimate the time at which the additional timber volumes will be harvested.
- . Calculate employment (direct, indirect and induced) linked to implementation of the activities under the Agreement and to processing of the timber volumes made available.
- . Starting from impact in terms of employment, calculate impact in terms of before-tax salaries and wages for each of the three effect categories.
- . On the basis of impact in terms of salaries and wages, calculate social gains from employment linked to carrying out the activities under the Agreement and to processing of the timber volumes made available.
- . On the basis of the timber volumes made available, estimate resource rent and earnings in foreign currencies on exported products.
- . Provide a qualitative description of the externalities associated with activities under the Agreement.
- . On the basis of impact in terms of employment and timber volumes processed, calculate fiscal and para-fiscal benefits (including indirect taxes and stumpage fees payable in cash) to the provincial and federal governments.

Finally, based on impact in terms of employment, calculate the budgetary savings for governments in unemployment insurance and social assistance premiums.

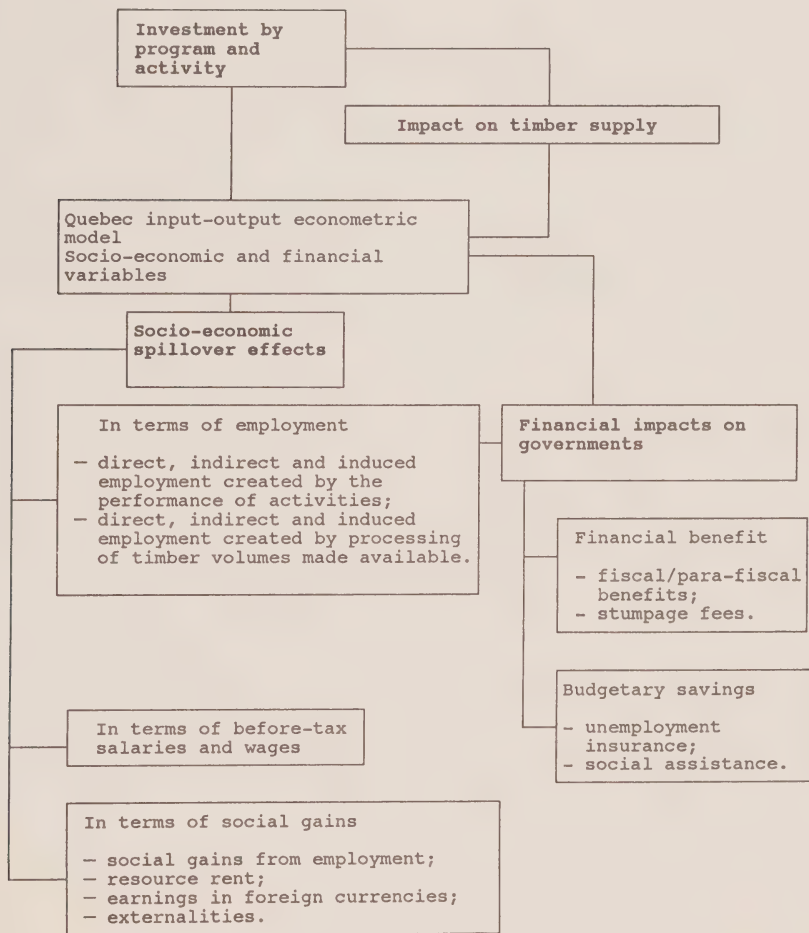


Figure 1. Main methodological steps.

### **3. AGREEMENT IMPACTS EVALUATION**

The evaluation of the socio-economic and financial impacts of the Agreement was produced using the evaluation criteria described in Section 1 and the methodology presented in Section 2.

Given the complexity of the models employed and the volume of data analyzed, this section only gives certain key elements of impact calculation. The complete set of calculations is assembled in the Technical Annex to the evaluation (Sous-comité d'évaluation, 1991).

This chapter comprises three sections: Section 3.1 describes the results achieved by the Agreement; Section 3.2 summarizes the estimate of the increased timber supplies which can be attributed to the Agreement; Section 3.3 presents the socio-economic and financial impacts of the Agreement.

#### **3.1 Results achieved by the Agreement**

Table 1 shows the initial programming and the results achieved by program and activity for the 1985-1991 period. The expenditures shown in Table 1, converted to constant October 1990 dollars, served as the basis for the calculation of socio-economic and financial impacts.

Note that the final data on results achieved for the 1990-1991 exercise were not available when this study was carried out. Consequently, provisional data were used for this financial exercise. This should have no marked effect on the results achieved during the 1985-1991 period or on the results of the evaluation.



**Table 1.** Initial programming and results achieved by program and activity (1)  
(In current dollars)

Programs and Activities	Initial Programming (\$ 000)	Results Achieved Operations(2)	Expenditures (\$ 000)
<b>1.Management of Crown Land</b>			
Seed production	1 300	4 572 hl	1 269.8
Production of seedlings	12 000	70 975 tp	11 002.1
Plantation	159 500		
.site preparation	---	255 319 ha	60 477.1
.manual planting	---	230 892 ha	86 494.7
Regeneration tending	9 000	50 947 ha	21 996.2
Applied research	8 200	N/A	8 200.1
<b>Sub-total</b>	<b>190 000</b>	<b>N/A</b>	<b>189 440.1</b>
<b>2.Management of Private Woodlands</b>			
Site preparation	40 800	104 960 ha	38 809.6
Planting	49 200		
.reforestation	---	103 413 ha	40 792.2
.tending	---	26 478 ha	9 618.9
<b>Sub-total</b>	<b>90 000</b>	<b>N/A</b>	<b>89 220.7</b>
<b>3.Management of Indian Lands</b>			
Silvicultural treatments	---	5 874 ha	1 718.6
Road constr./maintenance	---	51 km	254.3
Technical support & admin.	---	N/A	1 957.6
<b>Sub-total</b>	<b>4 000</b>	<b>N/A</b>	<b>3 930.4</b>
<b>4.Greenhouse Infrastructures</b>	<b>10 000</b>	<b>N/A</b>	<b>9 483.1</b>
<b>5.Fight Against Maple Dieback</b>			
Research & development	---	N/A	1 440.5
Operational fertilization	---	10 907 ha	3 616.8
Management	---	N/A	1 261.3
<b>Sub-total</b>	<b>---</b>	<b>N/A</b>	<b>6 318.6</b>
<b>6.Mgmt., Info. &amp; Evaluation</b>	<b>6 000</b>	<b>N/A</b>	<b>5 362.3</b>
<b>7.Communications</b>			
Regional activities	---	N/A	858.2
National activities	---	N/A	1 033.8
<b>Sub-total</b>	<b>---</b>	<b>N/A</b>	<b>1 892.0</b>
<b>TOTAL</b>	<b>300 000</b>	<b>N/A</b>	<b>305 647.1</b>

(1) Provisional data on results achieved were used for 1990-1991

(2) hl = hectolitres; tp = thousands of plants; ha = hectares

Examination of the Table indicates that:

- . Overall expenditures under the Agreement for the 1985-1991 period represent 102% of the initial budgetary allocation. The fact that the initial budget was exceeded derives from the introduction in 1988 of the program to fight against maple dieback.
- . In general, the allocation of expenditures is quite close to what was initially planned. This allocation of expenditures is as follows: 62.0% for management of Crown Land forests, 29.2% for management of private woodlands, 3.1% for greenhouse infrastructures, 2.1% for the fight against maple dieback, 1.8% for management, information and evaluation, 1.3% for management of Indian Lands and 0.6% for communications.
- . Silvicultural achievements include about 362 900 hectares of site preparation prior to reforestation, 336 300 hectares of reforestation and 77 900 hectares of regeneration tending<sup>1</sup>.

### 3.2 Estimate of increased timber supply

This estimate is based on four main assumptions.

**Assumption 1:** The Crown Land Forest program generates a short-term increase in timber supply (allowable cut effect). This short-term gain is in addition to the volumes harvested in the context of salvage cutting, commercial thinning and conversion cutting of the Indian Lands program.

**Assumption 2:** The Private Woodlands program and the other silvicultural activities in the Indian Lands program only allow a long-term increase in timber supply (when the treated areas are to be harvested).

---

<sup>1</sup> These data include the following achievements of the Indian Lands program: 2 580 hectares of site preparation, 1 980 hectares of planting and 460 hectares of regeneration tending.

**Assumption 3:** Still in terms of increase in timber supply, conditions in the resinous strata of the Crown Land forests (according to SYLVA software for calculation of the annual allowable cut) are representative of the territories covered by the management programs for Crown Land forests and private woodlands.

**Assumption 4:** For the Crown Land and Private Woodlands programs, increase in timber supply is proportional to the expenditures foreseen for forestry management as shown in the forestry management and supply contracts (C.A.A.F.). These expenditures are connected with production of seeds and seedlings, planning, performance, supervision and control of forestry projects, as well as administrative costs.

#### Short-term increase

In the framework of the Quebec C.A.A.F. planning, it was estimated that investment in forest management amounting to \$779.1 million (in constant October 1990 dollars for the 1985-1991 period) would result in an immediate increase in annual allowable cut of 4.8 million cubic metres per year.<sup>2</sup>

When expressed in constant October 1990 dollars, management expenditures of the Crown Land Forest program amount to \$210.1 million.<sup>3</sup> This sum represents 27.0% of the investments incurred within the C.A.A.F. framework for the 1985-1991 time-frame. Assuming that the increase in timber supply is proportional to the investment in forest management (assumption 4), the short-term gain in timber supply generated by the Crown

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<sup>2</sup> Service de l'allocation des bois, ministère de l'Énergie et des Ressources du Québec, 1990. This increase in allowable cut excludes the impact of cuts with protection of pre-established regeneration.

<sup>3</sup> This sum excludes one-third of the expenditures incurred for the production of seeds and plants, allocated to private woodlands, as well as the cost of applied research. However, it includes two-thirds of the cost of the Greenhouse Infrastructures program, allocated to Crown Lands forests.

Land Forest program is 1.30 million cubic metres per year, or 7.77 million cubic metres for the 1985-1991 period.<sup>4</sup>

The volumes harvested during conversion cutting, commercial thinning and salvage cutting in the Indian Lands program also represent a short-term increase in timber supply. These volumes are estimated to be 23 300 cubic metres.

According to these estimates, activities under the Agreement should generate a short-term increase in timber supply of about 7.79 million cubic metres.

#### Long-term increase

The volumes harvestable as a result of the Private Woodlands program are also estimated as a proportion of the investments incurred within the C.A.A.F. framework (assumptions 3 and 4).

Converted to constant October 1990 dollars, management costs for the Private Woodlands program amount to \$110.0 million.<sup>5</sup> This sum represents 14.1% of the investment incurred under the C.A.A.F. It follows that there is a long-term increase of 0.68 million cubic metres per year, that is to say, 4.07 million cubic metres for the 1985-1991 period.

As for the additional yields in the Indian Lands program, these are evaluated by taking the difference between the volumes to be obtained on the treated areas and the volumes which would have been obtained if these areas had not been treated. These yields are estimated at 227 300 cubic metres.

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<sup>4</sup> This estimate indicates that the Crown Land forest management program should account for 27% of the short-term increase in annual allowable cut attributable to forest management activities on Crown Land for the 1985-1991 period. As indicated in note 2, this estimate does not take into account the impact of cuts with protection of pre-established regeneration.

<sup>5</sup> As a corollary to note 3, this sum includes one-third of the costs for production of seeds and plants in the Crown Land Forest program. It also includes one-third of the expenditures on the Greenhouse Infrastructures program, allocated to private woodlands.

According to these estimates, wood volumes of 4.30 million cubic metres should be produced in the long term as a result of the activities under the Agreement.

### Overall results

Based essentially on a proportionality-of-investments approach, evaluation of the increase in timber supply indicates that:

- Total increase in timber supply attributable to the Agreement is estimated at 12.1 million cubic metres, 64% of which should be obtained in the short term and 36% in the long term.
- Close to 98% of the volume made available should be generated by the Crown Land (64%) and Private Woodlands (34%) programs.

## **3.3 Estimate of socio-economic and financial impacts**

This section describes the results of the evaluation of the impacts attributable to the Agreement. Section 3.31 presents quantitative data, while Section 3.32 gives a qualitative description of the externalities of the Agreement.

### **3.31 Quantitative data**

Tables 2 and 3 synthesize the socio-economic and financial benefits from the Agreement. Tables A1 and A2 (annexed) set out in detail by program and by activity the benefits linked to implementation of the projects. In addition, in order to better illustrate employment attributable to the Agreement, Table 4 presents the percentage distribution of employment generated by program and by activity.



**Table 2.** Estimate of socio-economic benefits  
(In thousands of constant October 1990 dollars) (1)

	Impact of implementation	Impact of processing			Total
	short term	short term	long term	sub- total	
<b>1. Employment</b>					
(person-years)					
. direct	6 940	7 825	4 315	12 140	19 080
. indirect	871	6 965	3 840	10 805	11 676
. induced	4 687	8 874	4 893	13 768	18 454
<b>Total</b>	<b>12 498</b>	<b>23 664</b>	<b>13 049</b>	<b>36 713</b>	<b>49 211</b>
<b>2. Before-tax salaries &amp; wages</b>					
. direct	194 821	281 226	155 069	436 295	631 117
. indirect	19 226	191 826	105 774	297 599	316 825
. induced	65 043	123 155	67 908	191 064	256 107
<b>Total</b>	<b>279 090</b>	<b>596 207</b>	<b>328 751</b>	<b>924 958</b>	<b>1 204 049</b>
<b>3. Social gains</b>					
Social gains from employment					
. direct	52 937	75 901	41 852	117 754	170 690
. indirect	5 229	51 642	28 476	80 118	85 346
. induced	18 056	34 189	18 852	53 041	71 098
Resource rent	N/A	24 370	13 437	37 807	37 807
Foreign currency earnings	N/A	58 768	32 405	91 173	91 173
<b>Total</b>	<b>76 222</b>	<b>244 870</b>	<b>135 023</b>	<b>379 893</b>	<b>456 114</b>

(1) Except for employment which is expressed in person-years

**Table 3. Estimate of financial benefits to governments**  
(In thousands of constant October 1990 dollars)

	Impact of implementation	Impact of processing			Total
	short term	short term	long term	sub- total	
<b>1. Financial benefits</b>					
. Provincial					
.. direct	57 340	90 879	50 111	140 990	198 330
.. indirect	5 087	79 820	44 013	123 834	128 921
.. induced	11 808	22 356	12 327	34 684	46 492
<b>Sub-total</b>	<b>74 235</b>	<b>193 056</b>	<b>106 452</b>	<b>299 508</b>	<b>373 743</b>
. Federal					
.. direct	37 828	83 701	46 153	129 855	167 683
.. indirect	3 572	37 935	20 917	58 852	62 425
.. induced	8 555	16 201	8 933	25 134	33 689
<b>Sub-total</b>	<b>49 955</b>	<b>137 837</b>	<b>76 004</b>	<b>213 841</b>	<b>263 796</b>
<b>Total</b>	<b>124 190</b>	<b>330 893</b>	<b>182 456</b>	<b>513 349</b>	<b>637 539</b>
<b>2. Budgetary savings</b>					
. Provincial					
.. social assistance	2 957	5 598	3 087	8 685	11 641
. Federal					
.. unemployment insurance	9 397	17 792	9 811	27 603	36 999
.. social assistance	2 957	5 598	3 087	8 685	11 641
<b>Sub-total</b>	<b>12 353</b>	<b>23 390</b>	<b>12 897</b>	<b>36 288</b>	<b>48 641</b>
<b>Total</b>	<b>15 310</b>	<b>28 988</b>	<b>15 984</b>	<b>44 972</b>	<b>60 282</b>

**Table 4.** Distribution by program and activity of total employment generated  
(Percent)

Programs/activities	Impact of <u>implementation</u>	<u>Impact of processing</u>			Total
	short term	short term	long term	sub- total	
<b>Crown Land Forest</b>					
. seeds and plants	1.6	N/A	N/A	N/A	1.6
. plantation (1)	12.3	47.3	0.0	47.3	59.6
. nat. regen. tending	1.9	0.6	0.0	0.6	2.5
. research	0.5	N/A	N/A	N/A	0.5
<b>Sub-total</b>	<b>16.3</b>	<b>47.9</b>	<b>0.0</b>	<b>47.9</b>	<b>64.2</b>
<b>Private Woodlands</b>					
. preparation	2.8	N/A	N/A	N/A	2.8
. plantation (1)	4.7	0.0	25.1	25.1	29.8
<b>Sub-total</b>	<b>7.5</b>	<b>0.0</b>	<b>25.1</b>	<b>25.1</b>	<b>32.6</b>
<b>Indian Lands</b>					
. all activities	0.3	0.1	1.4	1.5	1.8
<b>Greenhouses</b>					
. construction	0.5	N/A	N/A	N/A	0.5
<b>Maple Dieback</b>					
. research	0.1	N/A	N/A	N/A	0.1
. fertilization	0.2	N/A	N/A	N/A	0.2
. management	0.1	N/A	N/A	N/A	0.1
<b>Sub-total</b>	<b>0.4</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>0.4</b>
<b>Management</b>					
<b>Communications</b>	0.5	N/A	N/A	N/A	0.5
<b>TOTAL</b>	<b>25.5</b>	<b>48.0</b>	<b>26.5</b>	<b>74.5</b>	<b>100.0</b>

(1) Including plantation tending

These tables highlight the following points:

Socio-economic benefits

- . Direct impact of the Agreement in terms of employment required for implementation of the programs amounts to 6 900 person-years. About 80% of this employment is linked to the projects involving site-preparation and planting. Total impact from implementation in direct, indirect and induced employment is 12 500 person-years.
- . Distribution by program of total employment attributable to execution of the projects is: 64% for the Crown Land Forest program, 29% for the Private Woodlands program and 6% for the remaining programs.
- . Employment linked to the processing of timber volumes made available by the programs is estimated to be 36 700 person-years, 64% of which is estimated to be obtained in the short term and 36% in the long term.
- . In total, the impact of the Agreement in employment generated amounts to 49 200 person-years, 75% of which is linked to processing of timber volumes made available and 25% to implementation of the Agreement.
- . Converted to salaries and wages, direct employment connected to implementation of the programs represents \$194.8 million. This amount corresponds to 56% of the global Agreement expenditures for the 1985-1991 period (constant October 1990 dollars).
- . Salaries and wages (direct, indirect and induced) linked to implementation of the Agreement add up to \$279.1 million. Taking into account wood-processing activities, salaries and wages generated by the Agreement exceed \$1.2 billion.

- Social gains from employment (direct, indirect and induced) attributable to execution of the projects amount to \$76.2 million. When taking processing activities into account, social gains from employment add up to \$327.1 million.
- In addition, Quebec society realizes, in the short and long terms, other advantages linked to processing of the timber volumes made available. These gains include \$37.8 million in resource rent and \$91.2 million in earnings in foreign currencies, thus bringing total social gains to \$456.1 million.

#### Financial impacts on governments

- Financial benefits to governments in fiscal and para-fiscal revenues and stumpage fees amount to \$637.5 million, 81% of which is linked to processing of the timber volumes made available. Of these, the provincial and federal governments receive 59% and 41% respectively.
- Direct impact represents 77% of the financial benefits linked to implementation of the Agreement. In the case of processing, direct impact accounts for only 53% of the financial benefits.
- Budgetary savings for the governments amount to \$60.3 million, 75% of which is related to processing of timber volumes.
- Over 80% of the budgetary savings are realized by the federal government.

### **3.32 Externalities**

Spillover effects not directly related to the objectives of the Agreement or those outside the consideration of the other evaluation criteria are presented here in terms of positive and negative externalities.



These externalities show up mainly in the context of sustainable development and integrated forest resource management. However, this section presents only a brief description, given the fact that these effects are poorly known and do not easily lend themselves to an overall evaluation. For example, the impact of silvicultural activities on the forest environment depends on the interaction of many variables, linked notably to particular ecological characteristics of the sites, kinds of activities, technologies employed, period of the activity and area treated.

### Positive externalities

#### **. Protection of soil and water**

Reforestation projects carried out under the Agreement speed up the introduction of tree cover in poorly regenerated or unregenerated areas, thus minimizing the danger of water and wind erosion of the soil. In so doing, these projects also contribute toward improving water quality and regulating flow of water courses.

#### **. Improvement of wildlife habitats**

Though oriented toward putting sites back into production, most of the silvicultural projects under the Agreement have positive effects on wildlife habitats. For example, with time, reforestation provides a new vegetation cover for wildlife. Similarly, pre-commercial and commercial thinning activities provide food for rodents and cervidae.

It is important, however, to note that only those sites in the Crown Land forests which have been identified as essential wildlife habitats by the ministère du Loisir, de la Chasse et de la Pêche du Québec are the subject of specific operational measures. Furthermore, in private woodlands, landowners are not bound by any operating standards (Gouvernement du Québec, 1990). Consequently, it is possible that certain projects under the Agreement could have resulted in negative effects on wildlife habitats.

- **Improvement of the landscape**

Forest management activities under the Agreement, especially reforestation, contribute toward improving the aesthetics of wooded and rural zones by reducing the time for regeneration or by improving the vigor of the existing vegetation.

- **Development of silvicultural expertise**

Thanks to the silvicultural projects carried out under the Agreement, forest managers, workers and entrepreneurs have shown significant improvement in their knowledge of forest management in recent years. In addition, private firms, joint venture organizations and forestry cooperatives have appeared or been developed, thus creating a pool of expertise, mainly in the area of nurseries and reforestation.

- **Improvement of forest accessibility**

Investment amounting to \$254 000 has been made in the improvement and construction of roads under the Forest Management Program for Indian Lands. In addition, although not constituting an integral part of the Agreement, forestry road activities have been carried out to allow implementation of the Crown Land and Private Woodlands Management programs. These activities lead to improved access to the forest for various users of forest resources. In this regard, it can be mentioned that hunting, fishing and trapping in Quebec generate annual expenditures of about \$1 billion (Gouvernement du Québec, 1990).

In addition, certain silvicultural projects under the Agreement, such as commercial and pre-commercial thinning activities, have had the effect of improving mobility for users of the forest environment.

- **Specific socio-economic impacts of the Forest Management Program for Indian Lands (FMPIL)**

The evaluation study of the first phase of the FMPIL (Éconotec, 1990) identifies several positive impacts of a socio-economic nature for participating communities. These impacts include the formation of firms for managing community wood resources and for conducting silvicultural contracts outside the reserves. In addition, the FMPIL has induced communities to register numerous Natives in silvicultural training courses, over and above the training acquired within the framework of the projects in the program. The FMPIL has also allowed communities to buy silvicultural equipment, so that Native firms offering qualified, experienced labor and appropriate equipment have been set up.

- **Contribution to regional economic development**

Most of the activities under the Agreement were carried out in peripheral regions where the economy is dependent on forestry activity and is poorly diversified. In fact, the forestry sector employs at least 15% of the labor force in more than 370 Quebec municipalities. Among these, about a hundred towns and villages are one-industry forestry centres (Gouvernement du Québec, 1990). The Agreement has thus contributed to developing or at least maintaining the economic development of several regions of Quebec.

- **Public information**

By means of its communications and information activities, the Agreement has helped make the public in Quebec and Canada more aware of the importance of forestry activities, the stakes in the forestry sector and the management efforts shared by the two governments. In addition, by their presence on the Quebec scene, the silvicultural activities under the Agreement help bring the benefits of forestry management to public attention.

## Negative externalities

### . **Possible damage to the forest environment**

Certain activities under the Agreement could have had negative effects on the forest environment. In particular, these effects can be linked to the use of chemical herbicides and silvicides potentially harmful to biological activity in the local environment, to inadequate site preparation practices causing soil deterioration, or even to reforestation with coniferous monocultures to replace the natural mixed stock, thus reducing the ecological diversity of the local environment. It is important to note, however, that the adoption in 1988 of the "Règlement sur les normes d'intervention dans les forêts du domaine public" (Regulation on Standards for Operations in Crown Land Forests) and the development of silvicultural expertise have helped reduce the risk of harm to the environment from activities under the Agreement. In addition, the size of the areas reforested relative to the whole of the natural forest limits the dangers from reduction in ecological diversity linked to reforestation.

### . **Environmental pollution**

Emission of pollutants occurs during the processing of the timber volumes made available by the projects under the Agreement.

## CONCLUSION

This evaluation study shows that the Subsidiary Agreement on Forest Development has a considerable impact on Quebec society. This is expressed in terms of socio-economic impacts for society (including externalities) and financial impacts for the two governments. About 80% of the impacts were found to be associated with processing of the timber volumes made available and 20% with execution of the programs. In addition, about 70% of these impacts were found to be short-term and 30%, long-term.

More precisely, the increase in timber supply attributable to the Agreement was estimated at 12.1 million cubic metres, 64% of which was found to be obtained in the short term and 36% in the long term. The Crown Land Forest Management program alone made 7.8 million cubic metres available in the short term. Indicatively, the Agreement invested \$28.83 (October 1990 constant dollars) per cubic metre made available in both the short and the long term.

Also, the study estimates the direct, indirect and induced employment attributable to the Agreement to be 49 200 person-years. About 75% of this employment is linked to processing of the timber volumes made available and 25% to implementation of the Agreement. In this way, the Agreement was found to generate benefits in salaries and wages amounting to more than \$1.2 billion.

In addition, Quebec society was found to realize benefits of about \$456 million in the form of social gains from employment, resource rent and earnings in foreign currencies.

Furthermore, the provincial and federal governments were found to profit from financial benefits in fiscal and para-fiscal revenues and stumpage fees amounting to almost \$638 million. The two governments were also found to benefit from budgetary savings of about \$60 million in social assistance and unemployment insurance.



The study reveals several positive externalities linked to the Agreement. They include the protection of soil and water, the development of silvicultural expertise, certain specific socio-economic repercussions of the Indian Lands program and aid to regional economic development. Some negative externalities of an environmental nature were also identified.

Examination of the evaluation criteria and methodology shows that this study has identified the main socio-economic and financial impacts generated in Quebec by the Agreement. It is important to note, however, that evaluation of the impacts rests on numerous assumptions. These are connected in particular with results from planting, increase in timber supply and evolution of supply and demand for wood products in Quebec. In this respect, the study assumes that investment in forest management in Quebec will be maintained over the long term, that the plantations established under the Agreement will benefit from a tending program to ensure their normal development and that all the timber made available will be harvested and processed.

In spite of the uncertainties attached to the estimation of impacts, the results of this study show that the principal objectives of the Agreement have been achieved. In fact, the achievements of the Agreement allow a significant increase in timber supply, thus helping to ensure the short-term and long-term health and competitiveness of the Quebec forestry industry. In addition, implementation of the Agreement has generated short-term benefits having a definite impact on regional economic development. It therefore appears that, in keeping with its overall objective, the Canada-Quebec Subsidiary Agreement on Forest Development has generated spillover effects capable of stimulating forestry development and of increasing the economic impact of forestry activity in Quebec.

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## ANNEXES



**Table A1.** Estimate by program and activity of socio-economic benefits generated by the implementation of activities  
(In thousands of constant October 1990 dollars) (1)

	Crown Land Forest				Private Woodlands		Indian Lands	Green-house	Maple Dieback			Mgmt. Communi-	Total
	Seeds Plants	Plantation	Tending	Research	Site preparation	Plantation			Constr.	Research	Fertilization		
<b>Employment (person-years)</b>													
.. Direct	464	3 400	522	137	712	1 337	73	83		22	52	118	6 940
.. Indirect	39	385	60	24	146	102	11	62		4	16	20	871
.. Induced	301	2 271	349	96	515	864	51	87		15	41	83	4 667
<b>Total</b>	<b>804</b>	<b>6 057</b>	<b>930</b>	<b>256</b>	<b>1 372</b>	<b>2 303</b>	<b>135</b>	<b>233</b>		<b>41</b>	<b>108</b>	<b>222</b>	<b>12 498</b>
<b>Before-tax salaries and wages</b>													
.. Direct	9 676	94 578	14 613	4 364	21 660	37 880	2 207	3 135		702	1 620	605	194 821
.. Indirect	1 367	8 295	1 235	629	2 942	1 850	272	1 221		101	261	100	19 542
.. Induced	4 184	31 322	4 842	1 334	7 143	11 985	765	1 211		215	563	156	65 043
<b>Total</b>	<b>15 226</b>	<b>134 396</b>	<b>20 690</b>	<b>6 327</b>	<b>31 715</b>	<b>51 665</b>	<b>3 183</b>	<b>5 966</b>		<b>1 018</b>	<b>2 544</b>	<b>878</b>	<b>279 090</b>
<b>Social gains</b>													
.. Gains from employment	2 816	25 524	3 918	1 211	5 882	10 256	604	872		195	441	168	52 937
.. Indirect	270	2 410	362	116	842	504	64	423		19	105	100	5 229
.. Induced	1 161	8 751	1 344	370	1 983	3 327	196	336		60	156	51	18 056
.. Resource rent	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
.. Foreign currency earnings	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
<b>Total</b>	<b>4 248</b>	<b>36 684</b>	<b>5 624</b>	<b>1 697</b>	<b>8 706</b>	<b>14 087</b>	<b>863</b>	<b>1 631</b>		<b>273</b>	<b>702</b>	<b>235</b>	<b>76 222</b>

(1) Except for employment, which is expressed in person-years



Table A2. Estimate by program and activity of financial benefits to governments generated by the implementation of activities  
(In thousands of constant October 1990 dollars)

	Crown Land Forest				Private woodlands		Indian Lands	Green-house Constr.	Maple Dieback			Mgmt. commi- cations	Total
	Seeds Plants	Plantation	Tending	Research	Site preparation	Plantation			Research	Fertil- ization	Mgmt.		
<b>Financial benefits</b>													
.. Provincial	2 705	28 305	4 169	1 038	6 788	10 773	603	1 247	167	502	144	899	57 340
.. Direct	352	2 318	865	101	1 397	2 473	93	439	36	109	14	88	5 087
.. Indirect	302	2 318	865	101	1 397	2 176	128	220	39	102	34	210	11 808
.. Induced	3 816	36 346	5 413	1 381	8 671	13 388	791	1 905	222	714	192	1 196	74 235
.. Federal total													
.. Direct	1 671	18 285	2 697	818	4 616	7 162	426	855	132	344	114	709	37 828
.. Indirect	185	1 652	260	74	563	1 318	43	314	34	12	12	154	8 555
.. Induced	550	4 146	637	175	399	1 506	561	1 328	172	495	148	952	49 955
.. Sub-total	2 406	24 083	3 593	1 068	6 118	9 037	561	1 328	172	495	148	952	49 955
Total	6 223	60 430	9 006	2 449	14 989	22 444	1 352	3 233	394	1 209	340	2 121	124 190
<b>Budgetary savings</b>													
.. Provincial	190	1 433	220	61	325	545	32	55	10	26	8	53	2 957
.. social													
.. assistance													
.. Fedemployment	604	4 554	700	193	1 032	1 731	102	175	31	81	27	167	9 397
.. social													
.. insurance	190	1 433	220	61	325	545	32	55	10	26	8	53	2 957
.. insurance	795	5 987	920	253	1 357	2 276	134	230	41	107	35	219	12 353
.. Sub-total													
Total	985	7 419	1 140	314	1 681	2 821	166	285	51	132	44	272	15 310



